

March 19, 1946.

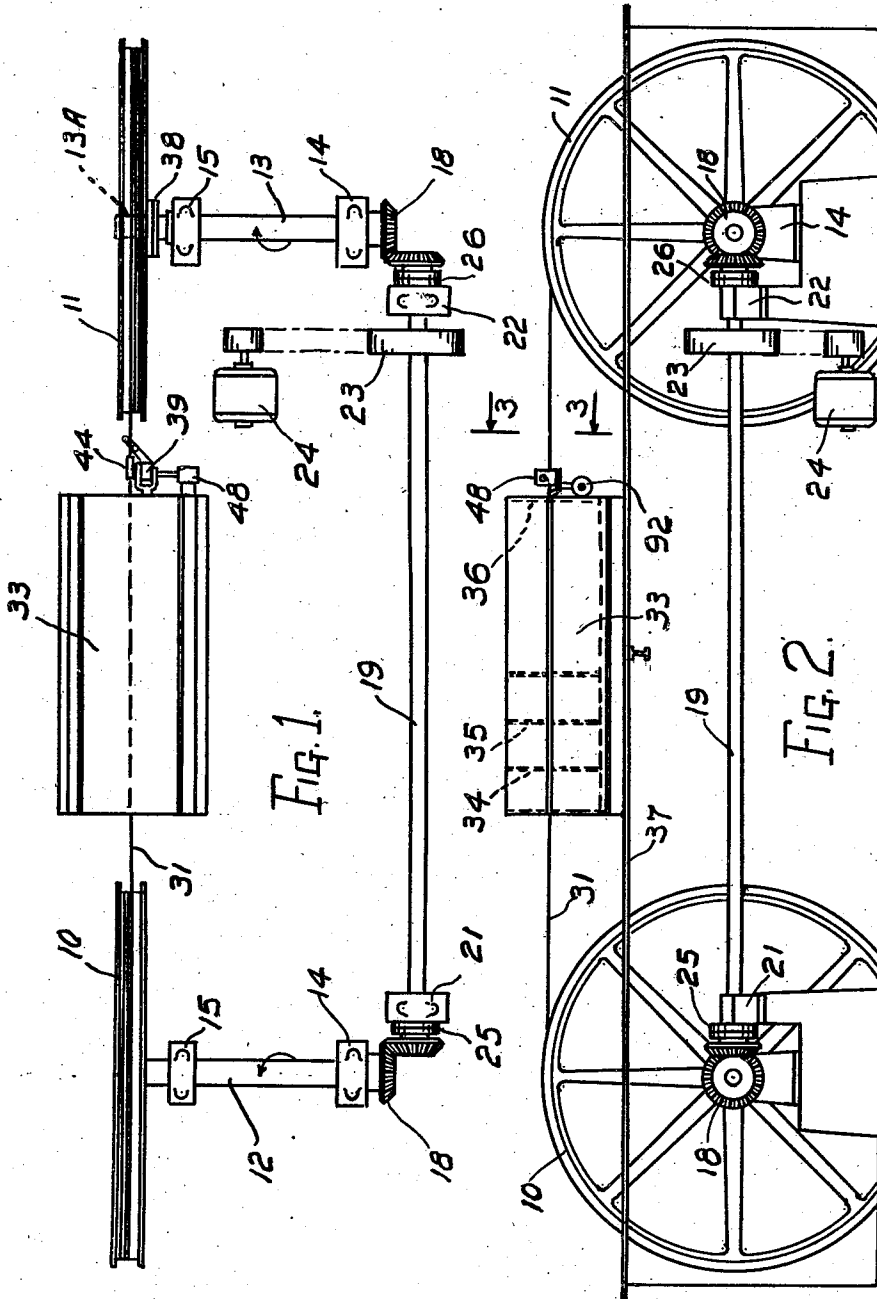
L. ILLMER

2,396,852

AUTOMATIC REEL REVERSING CONTROL FOR GRINDER MACHINES

Filed Aug. 9, 1943

6 Sheets-Sheet 1



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AUTOMATIC REEL REVERSING CONTROL FOR GRINDER MACHINES

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6 Sheets-Sheet 2

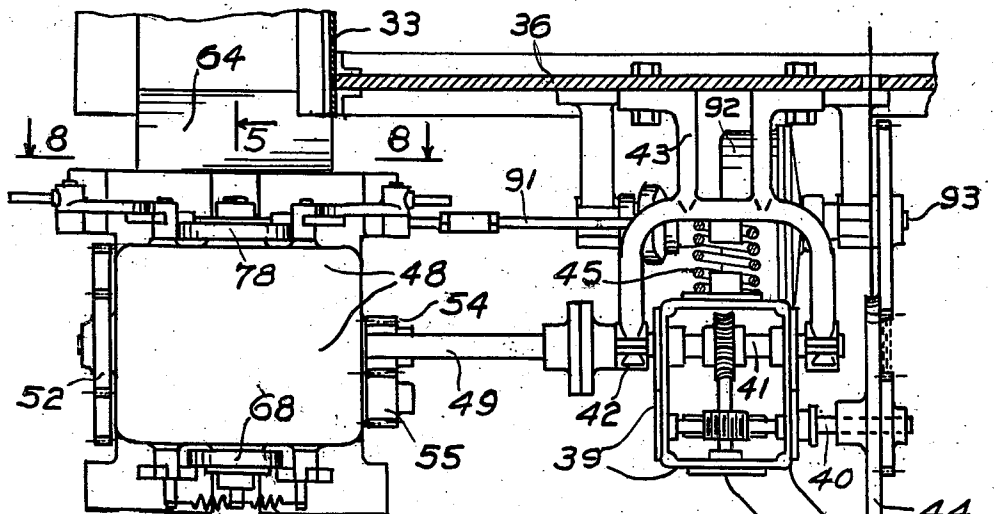


Fig. 4.

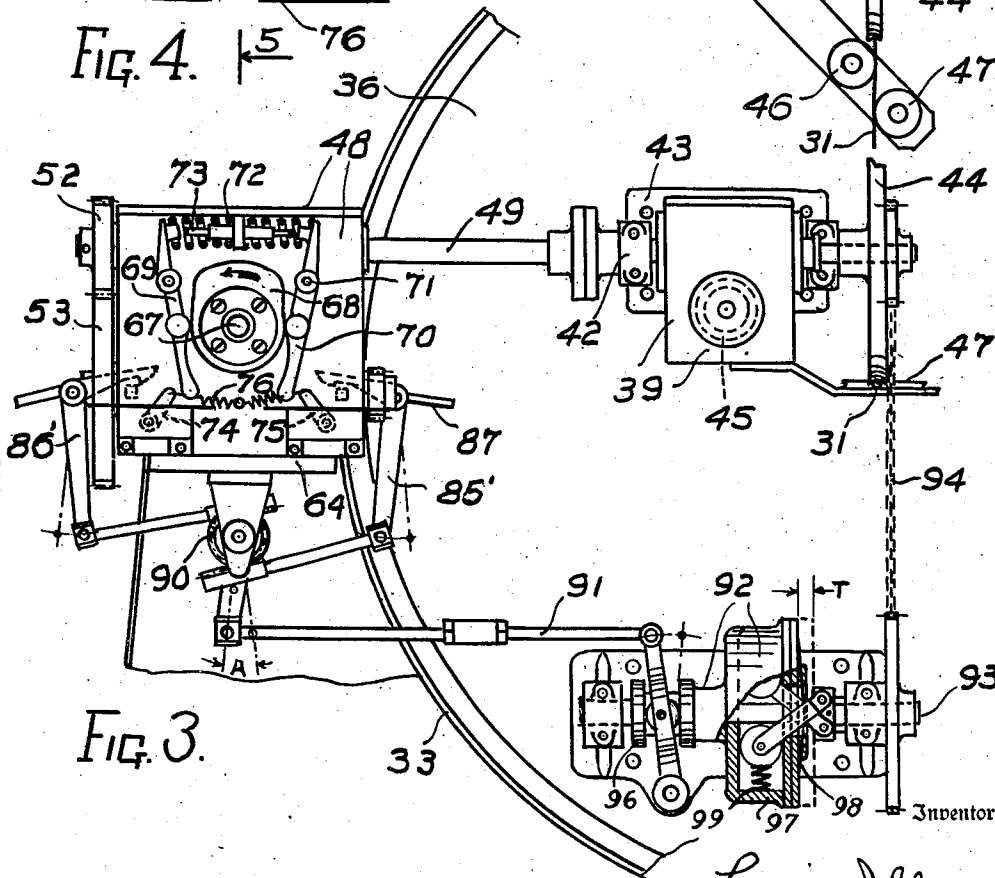


Fig. 3.

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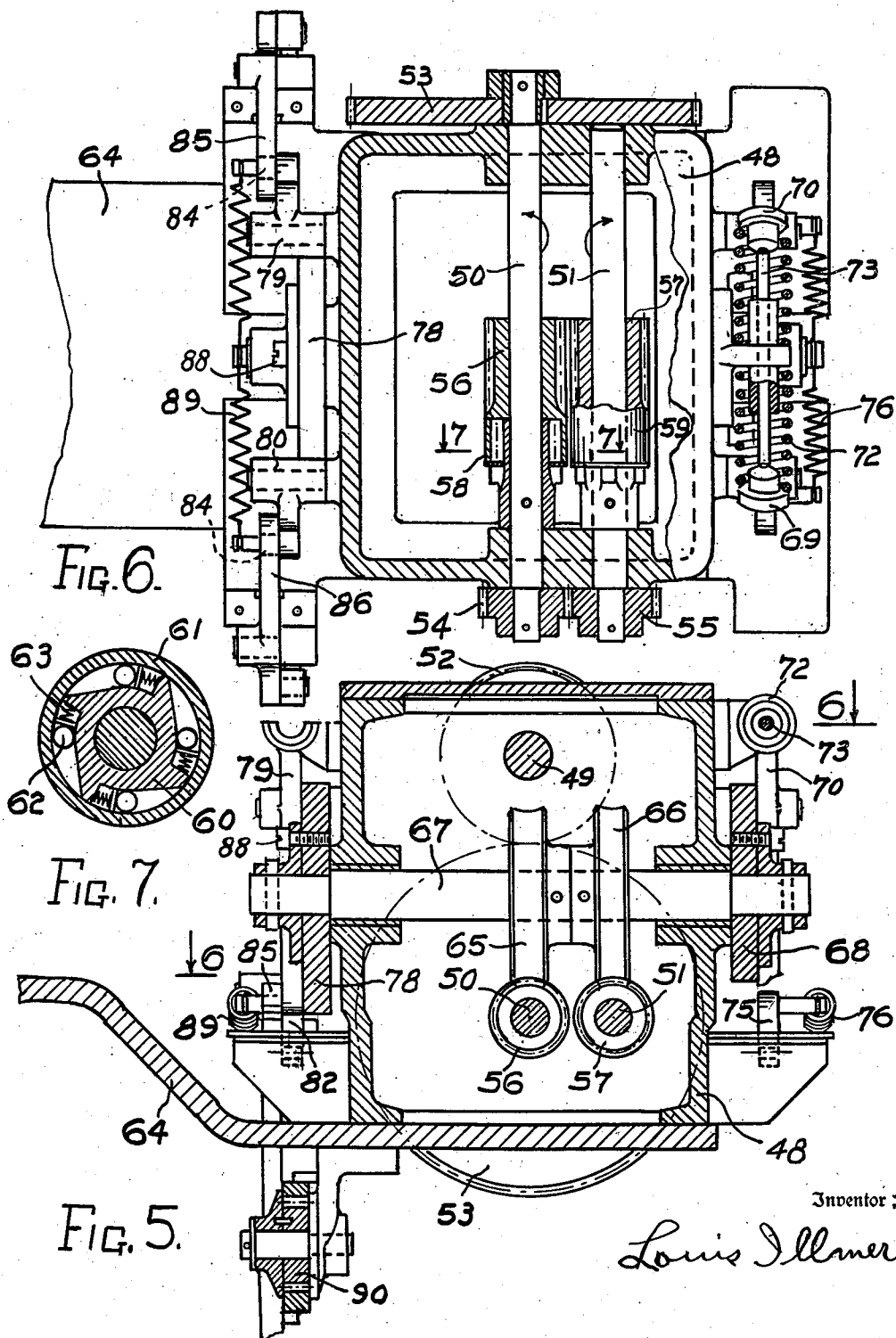
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AUTOMATIC REEL REVERSING CONTROL FOR GRINDER MACHINES

Filed Aug. 9, 1943

6 Sheets-Sheet 3



March 19, 1946.

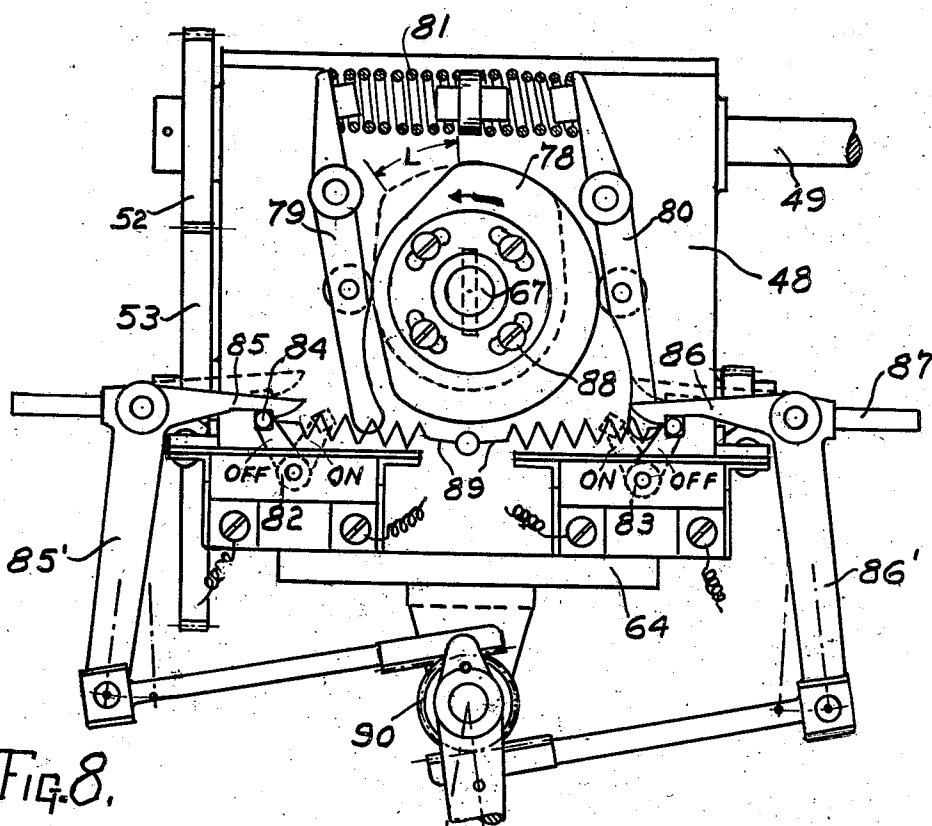
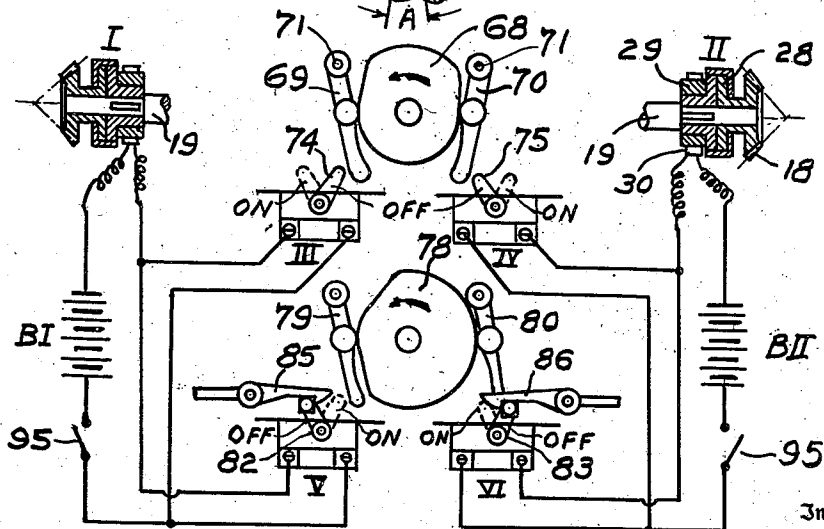
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AUTOMATIC REEL REVERSING CONTROL FOR GRINDER MACHINES

Filed Aug. 9, 1943

6 Sheets-Sheet 4



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AUTOMATIC REEL REVERSING CONTROL FOR GRINDER MACHINES

Filed Aug. 9, 1943

6 Sheets-Sheet 5

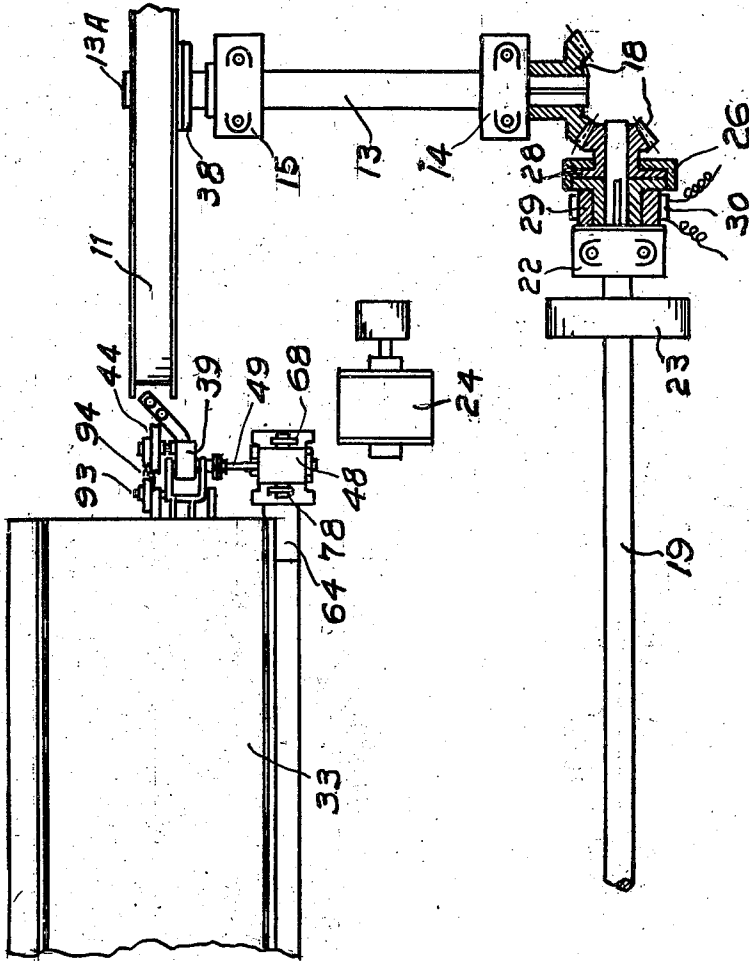


FIG. 10.

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AUTOMATIC REEL REVERSING CONTROL FOR GRINDER MACHINES

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6 Sheets-Sheet 6

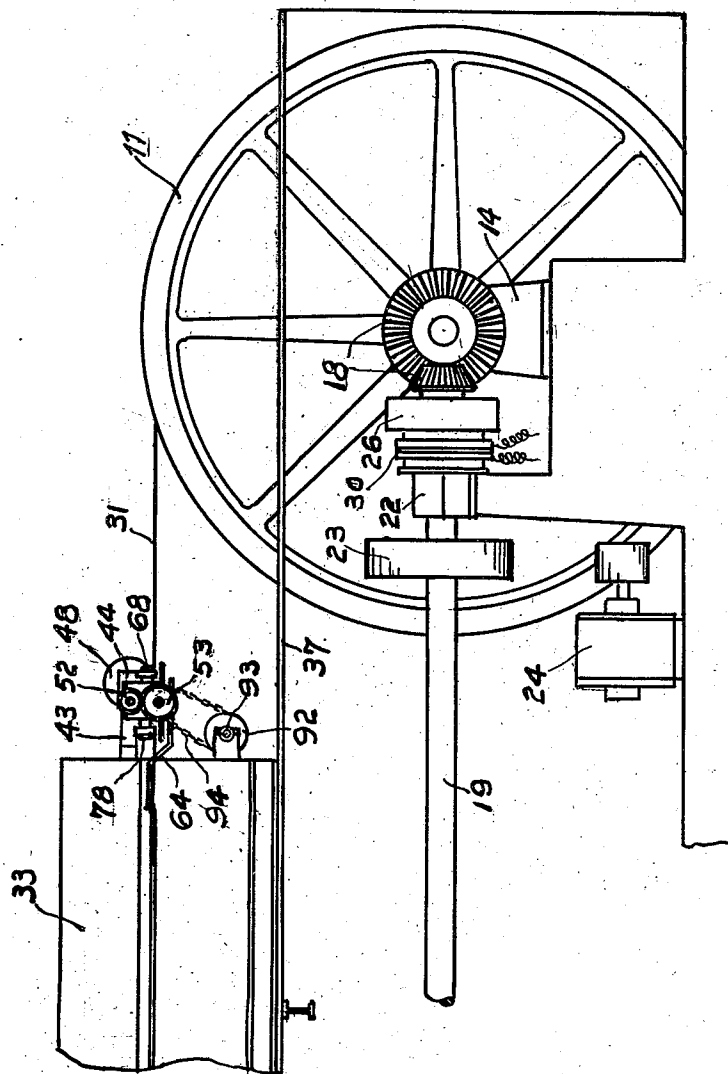


FIG. 11.

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UNITED STATES PATENT OFFICE

2,396,852

AUTOMATIC REEL REVERSING CONTROL
FOR GRINDER MACHINES

Louis Illmer, Cortland, N. Y.

Application August 9, 1943, Serial No. 498,017

17 Claims. (Cl. 242—54)

This invention relates to surface grinding machinery in which abrasive tape or an equivalent cutting agency may be utilized, and more particularly pertains to improved and compactly installed reel reversing controls by which a batch length of round or flat reelable workpiece may be dragged longitudinally at comparatively high velocity in successively reversed passes when brought into operative engagement with a plurality of abrasive elements carried by either stationary or rotating head means.

The present control appurtenances are especially applicable to heavy duty reeling means of a kind more explicitly set forth in my copending companion application entitled "Reel drive controls for grinder machines," Serial No. 495,948, filed July 23, 1943, and adapted to economically rough grind a reloadable batch of heavy piano wire, hard alloy steel or other high tensile reelable strands of comparatively large cross-sectional size on a low labor servicing basis, preferably without requiring any fast moving working parts except for the treated stock and reels thereof.

The instant self-acting control refinements are primarily directed to automatically or manually reverse a pair of conjointly driven reels of which the respective axles may be equipped with independently controlled clutch means, preferably of the electromagnetic type, that may be alternately rendered active to successively reverse the pass direction of a treated batch run. Metering wheel means located between said reels, may ride upon such strand and serve to measure a predetermined run length thereof, the reel reversals being herein synchronously timed with the passing of such measured length by means of a counter agency requiring comparatively small dimensions. During reversal, my fast moving reels are preferably slowed down to effect a gradual shift. Automatic governor means are herein set to a predetermined reduced speed at which it becomes expedient to effect such reversal without excessive impetus or shock.

The object of my invention is to devise an efficient and compact control of the indicated character capable of effectively handling a heavy batch of treated stock as transferred between massive high speed reels with a minimum cessation during each reversing period while the workpiece is being successively passed in opposed directions through grinder head means.

Reference is had to the accompanying six sheets of drawings which are illustrative of a

preferred exemplification, and in which drawings:

Fig. 1 represents a plan view of a heavy-duty reel layout substantially kept in scale and equipped with my reversing controls, and Fig. 2 an elevational side view thereof.

Fig. 3 is an enlarged fragmental end view of my control assembly as applied to a transverse end portion of a tubular grinder housing as seen from 3—3 of Fig. 2 to include governor means shown in partial section, and Fig. 4 is a top view of such assembly.

Fig. 5 shows a cross-sectional view taken along 5—5 of Fig. 4, and Fig. 6 a horizontal section along the broken line 6—6 of Fig. 5.

Fig. 7 depicts a ratchet detail taken along 7—7 of Fig. 6.

Fig. 8 presents a control linkage as seen from 8—8 of Fig. 4, and Fig. 9 schematically discloses a wiring diagram pertaining thereto.

Fig. 10 is an enlarged view of the control end of Fig. 1 to elaborate certain details thereof, and Fig. 11 shows an elevational side view of Fig. 10.

As arranged in Fig. 1, my controlled grinder system may comprise a pair of flanged reels 10 and 11 respectively mounted upon the driven parallel axles 12 and 13. These axles may each be carried between a fore-bearing 14 and an aft-bearing 15. One axle such as 13 may be sectionalized to constitute a master section having a short appended section 13A extending aft of the coupling 38.

The respective fore-shaft ends may each be provided with bevel or the like skew gear means 18 preferably of the speed reducer type. Such means may be operatively interconnected through the cross-shaft 19 mounted upon the spaced auxiliary bearings 21 and 22. A drive pulley 23 when located between the last named bearings may be belted to a single unidirectional main motor 24.

Separate electromagnetic clutch devices 25 and 26 may respectively be interposed between each such auxiliary bearing and its contiguous bevel gear to independently command the driving of its associated axle. As cross-sectionally detailed in Fig. 10, said clutch devices may respectively comprise an annular slip disc 28, also a switch controlled field coil 29 that may be energized through wired commutator rings such as 30.

The Fig. 1 installation is such that the reel axles may be motor driven in the opposed arrowed directions whenever one or the other of said clutches is rendered operative. The field coil current flow is intended to be switch con-

trolled so that only one magnetic clutch is allowed to become active during any given time period and thus constitute independently controllable drives for selectively reversing said axles in unison.

For larger size wires or the like reelable workpiece 31 of finite length, each smoothly turned rim of my mated reels is preferably kept to a common diameter in a commensurate relation to the workpiece size so as not to overstress or seriously set the wound wire. The windings about such rims may be laid in superimposed layers to leave a strand portion suspended between the mated reels.

Such abrasively treated batch may be carried in a continuous welded length of about one ton in weight to afford an ample run period between reel reversals. This practice not only raises the machine production rate but obviates overheating of the main motor 24 and also provides adequate time in which to air cool the rotating workpiece so as to materially reduce its surface temperature between successive passes. Each initial layer of prereeled stock may include a repeatedly used lead end section welded to each terminal of a treated run length of a batch and having a free lead end affixed to its reel perimeter. These appended strand lead sections insure that the entire interposed active batch portion may be uniformly ground at high velocity irrespective of any slowing down during strand reversing periods. When one magnetic clutch is thrown into commission, the other idling clutch will allow the axle to be dragged along by the spanning strand portion.

Such transferably suspended workpiece may be processed by any suitable type of grinder head arranged to treat the entire strand perimeter in a single pass. It is preferred to resort to the unitary tubular housing 33 provided with a series of slowly fed abrasive tapes that may be spaced edgewise and angularly distributed around the product axis in sufficient number to grippingly load a treated work piece up to its safe drag capacity.

Said housing may be mounted above the level of a pit floor 37 and be transversely partitioned by a plurality of grinder header discs such as 34, 35, etc., including an outer end disc 36. When completely processed, the entire finished batch length proper may be carried over upon one of the reels. Its reel hub may be equipped with a sectionalized axle having the coupling means 38 (see Fig. 1) interposed therebetween in a manner more specifically disclosed in the aforesaid companion application. When thus coupled, said one reel may be expeditiously uncoupled from its master section and have another interchangeable loaded reel substituted in place thereof. While the cited axle coupling means 38 are complementary in function with the present instrumentalities, their cooperative use is not necessarily essential.

Referring now to Figs. 3 and 4, these disclose my control assembly as mounted upon the housing end disc 36. Such control assembly may comprise a double worm gear reduction unit 39 having a high speed input shaft 40 and an axially spaced output or transmission shaft 41. The last named slow speed shaft may be mounted between bearings such as 42 which may be fixedly supported by the forked bracket 43 to serve as a trunnion carriage that allows of rocking the unit 39. A thrust spring 45 may be offset relative to the trunnion axes to partially counterbalance the unit 39. An overhanging end of the input shaft 40 is shown provided with a counter pulley or metering wheel 44 that preferably rides upon the reel spanning portion of the strand 31. As herein devised,

the unbalanced box weight overhanging said trunnions, serves to load said pulley and assure an adequate frictional grip for non-slippingly rotating the metering wheel in unison with successive workpiece passes. The disposition is such that the pulley rotations will properly respond and register a metered run length of transferred strand. If desired, a pair of axially staggered rollers 46 and 47 may guide the strand into centralized alignment with the housing axis.

Housed pilot means 48 may be equipped with a drive shaft 49 and coupled to the output shaft 41. Such demountable unit may be erected upon a laterally projecting platen 64 overhanging an end housing disc 36, as shown. Since each batch run length is preferably kept quite long, this necessitates a considerable reduction ratio between the metering wheel rotations and certain cam actuated switches associated with the pilot unit 48. It is further preferred to work with rotatable cam means that will synchronously make but a single revolution or completed beat for each two immediately following reverse passes of the strand 31.

To this end, said drive shaft 49 may be geared to the parallel dual worm shafts 50 and 51 through a pair of change gears 52 and 53. The selective compensation by substitute change gear pairs, readily permits of modifying the overall reduction ratio of my pilot unit to suit various wires of different batch lengths. The shown change gears correspond to an average size of treated wire, the gear 52 being increased in pitch diameter to speed up the dual shafts 50 and 51 for a shorter than average work piece run length.

Said dual shafts may be interconnected by the mated spur gears 54 and 55 to operate in unison (see Fig. 6) and which shafts may respectively be provided with the loosely mounted nonlocking worms or the like spiral pinions 56 or 57 that are separately actuated through the reversed ratchets 58 and 59. As disclosed in Fig. 7, each such ratchet may include a star wheel 60 circumscribed by a shell 61 and having one or more rollers 62 that may be urged into their respective converging grip regions by the resilient thrust means 63.

Each such ratcheted pinion respectively engages a separate spiral gear 65 or 66 which may both be mounted upon a common cam shaft 67. Since the dual shafts 50 and 51 preferably rotate oppositely and because of their interposed ratchets, said cam shaft 67 may be given a unidirectional rotation irrespective of the travel direction of the strand 31. When one of said ratchets such as 57 is brought into active engagement with its pinion 56 to operatively drive the mated gear 65, the inactive ratchet 59 will then allow the other gear 66 to overhaulingly rotate its released pinion 57.

As assembled in Fig. 3, one end of the driven shaft 67 may be provided with a single lobe primary cam 68 that successively actuates the complementary depending rocker levers or followers 69 and 70 about their respective fulcrums 71. The angular profile span of such lobe is purposely restricted to less than 180 degrees. A compression spring 72 may be interposed between upwardly projecting lever ends to maintain the lever rollers in operative contact with the cam 68. A guided interlocking rod 73 may slidably bridge said projecting lever ends. By suitably shortening the rod to a predetermined overall length, the lever rollers become stalled against simultaneously moving outwardly from the cam axis to an unwanted extent.

Each depending lever terminal may be given a rounded toe profile respectively disposed to coact

with the oscillatory snap arms 74 and 75 of the independently wired quick-acting switches III and IV (see Fig. 9). An interconnecting tension spring 76 shown in Fig. 3 may when unblocked, serve to maintain each such switch arm in follower relationship to its lever toe. These complementary snap arms 74 and 75 are reversely disposed with regard to their "on" and "off" positions so that the spring 76 urges said arms into their respective "off" positions.

The primary wiring connections through the battery BI conduct current flow to the clutch 25 (also designated as I in Fig. 9), while the corresponding electrical connections through the battery BII control the clutch 26 (also designated as II). If desired said batteries may readily be combined and wired from a common current source. The switch timing cam 68 is preferably geared to rotate unidirectionally in the arrowed direction to reach its starting position upon the completion of a reversed or double strand pass. During its first half revolution and shortly after commencing a corresponding one-way strand pass, said cam lobe will throw the switch III into its "on" position to energize clutch I. After a specifically measured length of strand run has been transferred to the clutch driven reel 10, the lobe of the cam 68 will then cause the lever 69 to shut off clutch I somewhat prior to the completion of said corresponding strand pass. During the resulting reel slow-down period, the suspended strand portion will momentarily drift owing to reel momentum; however the clutch released reels may be decelerated with dispatch when working with a comparatively heavy abrasive drag. Such requisite drift period is of significance in bringing my heavily loaded reel shafts to a lowered speed prior to undertaking the reversal thereof.

During such short drift period, the cam 68 will be carried onward to a certain extent, its profile being shaped to bring about reel arrest prior to allowing the actuated arm 75 of the switch IV to be shifted into its "on" position. In order to more sharply define the timing of strand reversal, I preferably resort to auxiliary twin control means that may be located at the opposite end of the pilot unit 48 (see Fig. 8). Such assembly may comprise the supplementary cam 78 having a lobe whose angular profile span may be greater than that of the primary cam 68 or be otherwise set to provide for a lead angle designated L. Said supplementary control means may be likewise provided with complementary follower levers 79 and 80, a lever compression spring 81 (devoid of rod means), and a pair of snap arms 82 and 83 respectively associated with the opposed quick-acting switches V and VI and having an arm tension spring 89 therebetween. The swinging end of each such pivoted snap arm may be provided with a latch block 84 (see Figs. 8 and 9) and a cooperating trip lever or trigger means such as 85 or 86 which may respectively be equipped with a manipulative handle 87.

The cam 78 may be adjustably secured in place on the cam shaft 67 by the screws 88 whereby to selectively modify the angular cam lead L. In the Fig. 9 diagram, the wiring connections for the supplementary snap arms 82 and 83 are reversely arranged relative to the primary arms 74 and 75. Their respective dual switch circuits are connected in parallel to provide a multiple circuit command for each of the electromagnetic clutches I and II. By release of its corresponding latch, one such circuit may be closed in advance of the

time when the lagging primary switch takes over clutch command. The profile of the supplementary cam 78 is preferably shaped to pick up and promptly reset such previously released switch arm into latched engagement.

As regards the intended mode of manual operation of my reversing controls, the following further explanation traces their functional behavior:

10 The reduction gearing is shown arranged to unidirectionally rotate both cams in their common arrowed direction at a relatively slow speed with respect to the metering wheel 44. Assuming the reel 11 to be preloaded with a long batch of coiled wire of which one end is affixedly carried over to the mated reel 10, then the primary and supplementary cams may initially stand in their respective Fig. 9 or zero setting positions.

20 The active strand batch prewound on each substitute spare reel, is intended to be kept to an accurately premeasured length. One end thereof may initially be lodged between the guide rollers 46 and 47 as a starting point. Assuming the change gears 52 and 53 to have been adjusted to compensate for a particular batch run length, then a minor correction in the corresponding zero reading of the pilot means 48 may be made by bodily lifting and freely rotating the metering wheel 44.

30 For such starting disposition, the snap switches III and IV will be turned "off" and both of the latched switches V and VI will be likewise set in "off" position. The supplementary cam follower levers 79 and 80 then become shifted into substantial parallelism and by interference of the arm 83 with the lever 80 positively block the release of the last named snap arm (see Fig. 8) while the other arm 82 assumes an unblocked condition. Should the latched hook 85 now be manually tripped, its cooperating snap arm 82 will freely drop into engagement with the nose end of the lever 79. The clutch I will thereby become energized and start driving the reel 10 to transfer the treated batch thereon. The resulting measured rotation imparted to the metering wheel 44 will be made manifest in the pilot unit 48 by slowly rotating both cams 68 and 78 in unison. Under progressive movement, the supplementary cam 78 will in a relatively brief period, relatch the switch arm 82 into its "off" position. In the meantime, the primary cam 68 will have advanced sufficiently to throw the switch arm 74 into its "on" position without interruption of the reel drive torque. After a measured batch length has been transferred, the shaft 67 and both cams are intended to approach a half turn in advance of their initial Fig. 9 position. In such onward position, the lever 69 will then have reached a cam profile position wherein the switch III will be snapped "off" to throw the clutch I out of active engagement which may cause the reels to come to rest. The switch controls are preferably arranged to stop or reverse the reels prior to wholly paying out a trailing batch lead section.

65 The use of snap switches brings about a rapid current break although the cam movement may be exceedingly slow. It will be obvious however, that substitute more sluggish make and break switching devices may be likewise employed.

70 After terminating such one-way batch pass, all switches will again stand in their respective "off" positions, but because of the stipulated half revolution advance of the cam shaft 67, the switch V will now be blocked and the alternate switch VI left free to trip. If thereupon the latched

trigger 86 is manually released, the resulting switch arm trip will throw the clutch II into active engagement and bring about a deliberate reversal of the batch pass direction, the next successive cam events following in the order described for clutch I. Upon completion of a reversed or double batch pass and assuming the use of a suitable gear reduction, the reels will again come to rest with both cams restored to their original Fig. 9 positions.

In order to eliminate the need for such vigilant attendance, I preferably provide for automatic reel reversal means. To this end, my latch hooks 85 and 86 may respectively be fashioned as bellcranks (see Figs. 3 and 8) whose depending branches 85' and 86' may be rack interconnected for simultaneous adjustment from a common spur gear 90 or the like linkage. Said gear may be adjustably rocked through the angle A by the push rod 91 linked to the reciprocative hub 96 of a centrifugal governor 92. Such governor may include a bodily shiftable cylindrical casing 97 having an axial stroke T and a drive spindle 93 that is chain connected at 94 to run in step with the counter wheel 44. This conventional type of governor may further comprise a pair of reversely suspended balls such as 98 that may be resiliently loaded by opposed springs such as 99 of which the thrust may be adjusted by any suitable means (not shown). It will be apparent that the described governor is effective in either direction of spindle rotation.

My governor linkage may be so arranged that when the primary cam 68 throws one of the electromagnetic clutches out of commission, the reciprocative push rod 91 will assume the critical slow speed position represented in Fig. 3 for which both latch hooks 85 and 86 become released into their respective dotted positions. One of the supplementary snap arms such as 83 will be blocked by its associated lever toe while the mated switch arm is then freely releasable. Said governor is therefore made to selectively trip a proper switch arm that will energize an appropriate clutch to instigate reel reversal. After the primary switch III or IV takes over clutch control, the supplementary switches V and VI periodically dwell in their "off" position.

The governor springs 99 may be set to shift my reversing clutches I and II prior to allowing the reels to come to a full stop. Such procedure facilitates rapid but unjolted automatic pass reversal in continuous succession without undue shock or the like operating disturbances, the strand transfer rate between reversal periods being preferably maintained at a relatively fast normal travel velocity of from two to three thousand feet per minute. When both clutches are disengaged and the governor drops to a certain reduced speed at which it is deemed expedient to initiate reel reversal, one such clutch is selectively reenergized by release of its unblocked switch arm. At full or normal governor speed, both hooks remain in latched engagement with the respective blocks 84 of their snap arms 82 and 83.

By the substitution of different pairs of change gears 52 and 53, the time period in which to automatically reverse the reels may readily be altered to accommodate batches of diverse lengths. Single reversible motor means or equivalent twin motors may be utilized to drive the several reel shafts in lieu of the specifically disclosed electromagnetic clutches. Such substitute means including mechanical clutches, may also be controlled in the

manner contemplated by my wheel dialing unit 48. The required number of repeat passes for rough grinding the product, depends among other considerations, upon the surface hardness of the treated material, the contacting area and mesh of the abrasive grit, and the extent to which a given initial size needs to be reduced. Upon the completion of any one batch and when the cams resume their original Fig. 9 position, an appropriate knife switch 95 may be manually opened without disturbing the wheel dialing means or its synchronized batch run.

With such manipulation, all of the active wire batch may finally be lodged about one of the reels and bodily removed by severing the axle coupling 38. An interchangeable spare reel having an unground batch of prereeled stock thereon, may be substituted. Such spare reel admits of pre-reeling round or flat strip stock through a straightener at comparatively slow speed without imposing a like limitation upon the rate of transfer after the spare reel is installed in place. With or without combining my automatic pass reversal controls with such coupled reel, a low processing cost per pound of product may be attained. The net grinding rate may thereby be held to a high level of effective machine output at the minimum of servicing labor cost and without unduly interrupting active machine performance during each successive reel reversal period.

The foregoing disclosures will, it is believed, make manifest to those skilled in this art, the more outstanding operative advantages afforded by my improved heavy duty reeling system. Certain structural aspects of my single illustrative exemplification may be modified when applied to analogous purposes, all without departing from the spirit and scope of my invention, heretofore described and more particularly characterized in the appended claims.

I claim:

1. In a grinder machine adapted to abrasively treat a batch of reelable product in successively reversed passes, a pair of mated axles of which one axle includes a master section having a product carrying reel demountably coupled thereto, a companion reel mounted upon the other of said pair of axles and having a product length portion transferably spanning the respective reel perimeters, metering wheel means rotatably driven in synchronism with the travel imparted to the treated workpiece while passing between said reels and serving to measure a run length of transferred product, controlled drive means including a single motive unit for reversing said axles in unison, and single pilot means controlling said drive means and rendered responsive to a predetermined number of wheel revolutions to automatically reverse the direction of product transfer after a metered run length has been passed from one toward the other reel, said pilot means being equipped with reversed ratchet means respectively arranged to respond to a work piece run length traveling in opposed directions.

2. In a grinder machine, a pair of mated axles respectively equipped with reel means cooperatively arranged to transferably pass therebetween a reelable workpiece, a metering wheel disposed by its consecutive turns to measure a prescribed run length of such transferred workpiece, controlled drive means including an electromagnetic clutch for one such axle, a wheel actuated cam mechanism including a quick-acting clutch switch having an actuated snap arm that is reversely shifted in response to the com-

pletion of a certain number of wheel rotations, and means for selectively altering the number of wheel turns allotted between such reversed arm shifts.

3. In a grinder machine, a pair of mated axles respectively equipped with reel means cooperatively arranged to transferably pass therebetween a run length of reelable stock, a speed reducer unit having a fast revolving input shaft and a laterally spaced output shaft and which output shaft is upheld by trunnion means, a metering wheel mounted upon said input shaft with the wheel rim disposed to ride upon the transferred stock, drive means for one of said pair of axles and which means include an electromagnetic clutch controlled by actuated switch means, and a wheel actuated cam mechanism including a drive shaft coupled to rotate in unison with said output shaft and serving to actuate the clutch switch means in response to a predetermined number of wheel turns.

4. In a grinder machine for treating a batch of reelable stock in successively reversed passes, complementary reel means for cooperatively transferring such work piece therebetween, controlled drive means for reversing said reels in unison, metering wheel means rotatably driven in synchronism with the travel imparted to the transferred work piece and serving to measure a prescribed run length thereof in either travel direction by a predetermined series of unidirectional wheel turns corresponding to a particular run length in one travel direction, and pilot means controlling said drive means and which pilot means include a single wheel actuated cam mechanism provided with reversed ratchet means respectively disposed to drive such cam mechanism unidirectionally and render the control of the drive means responsive to the completion of a particular run length in either travel direction.

5. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, mated axles respectively equipped with reel means arranged to transfer such work piece therebetween, motorized drive means for said axles including a separately controllable electromagnetic clutch serving each axle and which clutches when alternately energized successively rotate said reels in opposite directions, metering wheel means rotatably driven in synchronism with the reversed travel imparted by said reels to the transferred work piece and serving to measure a prescribed run length thereof by a predetermined series of unidirectional wheel turns in accordance with a particular run length travel direction, and pilot means including a wheel actuated cam mechanism that successively incites a separate switch for each such clutch and alternately renders said clutches responsive to a run length measurement in either travel direction.

6. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, mated axles respectively equipped with reel means arranged to transfer such work piece therebetween, motorized drive means for said axles including a separately controllable clutch serving each such axle and which clutches when alternately engaged successively rotate said reels in opposed directions, metering wheel means rotatably driven in synchronism with the reversed travel imparted to the work piece and serving to measure a prescribed run length thereof by a series of unidirectional wheel turns in accordance with a particular run length travel direc-

tion, and pilot means including a wheel actuated cam mechanism that successively incites engagement of each such clutch and which cam mechanism is selectively actuated through a pair of reversely mounted ratchet devices whereby to maintain a unidirectional rotation for the cam mechanism irrespective of the rotative direction imparted to said wheel means.

7. In a grinder machine for treating a batch of reelable stock in successive passes, complementary reel means for cooperatively transferring such work piece therebetween, controlled drive means for one such reel including an intermittently energized electromagnetic clutch, metering wheel means rotatably driven in synchronism with the travel imparted to the transferred work piece and serving to measure a prescribed run length thereof by a predetermined series of unidirectional wheel turns, and pilot means including a wheel actuated cam mechanism comprising mated followers which successively close separate switches respectively wired in parallel to conjointly energize said clutch during the measurement of the aforesaid series of wheel turns, one such switch being closed in advance of the other and the subsequent reopening of said advanced switch leaving the drive torque uninterrupted.

8. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, complementary reel means for cooperatively transferring such work piece therebetween, controlled electrically energized drive means serving to apply torque to one such reel, metering wheel means driven in synchronism with the travel imparted to the transferred work piece and thereby serving to measure a prescribed run length thereof by a series of unidirectional wheel turns, and pilot means including a wheel actuated cam mechanism comprising mated followers respectively arranged to periodically incite and successively close a separate switch wired in parallel to conjointly energize said drive means, the first closed switch being reopened subsequent to the closing of the other switch and the reopening of said other switch being rendered responsive to the completion of the aforesaid series of wheel turns.

9. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, complementary reel means for cooperatively transferring such work piece therebetween, a pair of controlled electrically energized drive means respectively arranged to alternately apply torque to said reels in reversed rotative directions, metering wheel means driven in synchronism with the travel imparted to the reversely transferred work piece serving to measure a prescribed run length thereof by a series of unidirectional wheel turns in accordance with a particular direction of run length travel, and pilot means including a wheel actuated cam mechanism comprising mated followers respectively arranged to periodically operate a quick-acting switch having a shiftable snap arm and which switches upon being closed separately establish current flow to the respective drive means in successive order, the reopening of the respective switches being rendered individually responsive to the completion of the aforesaid series of wheel turns corresponding to a particular direction of run length travel.

10. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, complementary reel means for cooperatively

transferring such work piece therebetween, a pair of controlled electrically energized drive means respectively arranged to alternately apply torque to said reels in reversed rotative directions, metering wheel means rotatably driven in synchronism with the travel imparted to the reversely transferred work piece and serving to successively measure a prescribed run length thereof by a series of unidirectional wheel turns, and pilot means including a wheel actuated cam mechanism comprising mated followers respectively arranged to periodically incite a quick-acting switch having a shiftable snap arm and which switches upon being closed separately establish current flow to the respective drive means in successive order, one such arm being blocked against release while the other arm remains unobstructedly releasable, said mechanism further comprising means for shifting and simultaneously latching both such arms in their respective open positions to periodically interrupt the applied torque during a reel reversal period.

11. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, complementary reel means for cooperatively transferring such work piece therebetween, a pair of controlled electrically energized drive means respectively arranged to alternately apply torque to said reels in reversed rotative directions, metering wheel means rotatably driven in synchronism with the travel imparted to the transferred work piece and serving to measure a prescribed run length thereof by a series of unidirectional wheel turns, pilot means including a wheel actuated cam mechanism comprising mated followers respectively arranged to periodically incite an individually associated switch and which switches upon being closed separately establish current flow to the respective drive means in successive order, the reopening of one such switch being rendered responsive to the completion of the aforesaid series of wheel turns and serving to automatically interrupt the applied reel torque thereof, and a governor device rotated in unison with said wheel and adapted to time the incited closure of the other switch prior to allowing the reels to come to rest.

12. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, complementary reel means for cooperatively transferring such work piece therebetween, a pair of controlled electrically energized drive means respectively arranged to alternately apply torque to said reels in reversed rotative directions, metering wheel means rotatably driven in synchronism with the travel imparted to the reversely transferred work piece and serving to successively measure a prescribed run length thereof by a series of unidirectional wheel turns, pilot means including a wheel actuated cam mechanism comprising mated followers respectively arranged to periodically incite a quick-acting switch having a shiftable snap arm and which switches upon being separately closed establish current flow to the respective drive means in successive order, said mechanism further comprising means for simultaneous latching both such arms in their respective open positions, and a governor device rotated in unison with said wheel means and operatively linked to automatically release one such latched arm.

13. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, complementary reel means for transferring such

work piece therebetween, a pair of controlled electrically energized drive means respectively arranged to alternately apply torque to said reels in reversed rotative directions and serving to instigate a maintained normal work piece transfer rate between reel reversal periods, a metering wheel rotatably driven in synchronism with the transfer rate imparted to the work piece, a wheel actuated cam mechanism disposed to periodically incite cooperating switches respectively provided with latch means and which switches when closed separately establish current flow to the respective drive means in successive order, said mechanism being further provided with means to wholly interrupt the applied torque by latching both such switches in their respective open positions, and a governor controlled device run in unison with the metering wheel and adapted to automatically initiate a reversal of said reels when the governor drops materially below its normal speed because of such torque interruption.

14. In a grinder machine for abrasively treating a batch of reelable stock in successive passes, complementary reel means for transferring such work piece therebetween, a pair of controllable electrically energized drive means respectively arranged to apply torque to said reels in reversed rotative directions, metering wheel means rotatably driven in synchronism with the travel imparted to the transferred work piece, and a pilot unit comprising a wheel actuated cam shaft having a pair of spiral gears affixed thereon that are respectively provided with a mated pinion and which pinions are equipped with reversely mounted ratchet devices through one of which the wheel turns are selectively transmitted to said shaft, such actuated shaft being further provided with a cam mechanism serving to intermittently operate complementary switches that when closed separately establish current flow to the respective drive means, said cam shaft when rotated through a partial revolution in either direction by the wheel means serving to simultaneously open both switches and thereby interrupt the applied wheel torque.

15. In a grinder machine for abrasively treating elongated stock in reversed passes, complementary reels adapted to transferably pass therebetween a reelable work piece of finite overall length at a certain relatively rapid maximum travel rate and remote from the respective ends of which length lies an interposed run section having a lead section at each end thereof that respectively provide for a drift period during each pass reversal, a pair of controllable electrically energized drive means respectively arranged to apply torque to said reels in reversed rotative directions, metering wheel means rotatably driven in synchronism with the travel imparted to said transferred work piece and serving to measure the length of such passed run section by a series of unidirectional wheel turns, pilot means comprising a wheel actuated cam mechanism including cooperating followers respectively arranged to periodically incite an individual switch and which switches when closed separately establish current flow to said drive means in successive order, the switch reopening being rendered responsive to the completion of said series of wheel turns and subsequent to which measurement the work piece travel rate is retarded during a drift period, and governor controlled reel reversing means for automatically terminating said drift period.

16. In a grinder machine for abrasively treat-

ing elongated stock, complementary reels adapted to transferably pass therebetween at a certain relatively rapid maximum travel rate a reelable work piece of finite overall length of which a trailing end section is affixed to one such reel to provide for a reel drift and ahead of which section lies a treated run section, controllable electrically energized drive means arranged to apply torque to the other reel, metering wheel means serving to measure the length of such passed run section by a series of unidirectional wheel turns, a wheel actuated cam mechanism including a follower that periodically incites a cooperating switch and which when closed establishes current flow to said drive means, the opening of said switch being rendered responsive to the measured length of said run section and subsequent to which opening the work piece travel is retarded by reel drift, and governor controlled supplementary torque applying means serving to automatically reverse a preceding direction of wheel rotation.

17. In a grinder machine for abrading elongated stock, complementary reels adapted to transfer a reelable work piece therebetween, controllable electrically energized drive means applying torque to one such reel, metering wheel means rotatably driven in synchronism with the travel imparted to the transferred work piece and serving to measure a prescribed run length thereof by a predetermined number of wheel turns, a wheel actuated mechanism comprising a pair of cooperating lobed cams rotated in unison of which the respective profiles are angularly shifted, each such profile being provided with a follower arranged to successively close a separate switch that respectively energize said drive means, the first closed switch being opened without torque interruption and the opening of the other switch being rendered responsive to the completion of the predetermined number of wheel turns.

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